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(54) Control cable adjuster device.

(57) A control cable adjuster device (Figure 1) for connection into and tensioning of a control cable run includes a termination member rod 12 extending into a tubular housing 11. Collets 13 biassed by a circumferential spring 17 co-act with serrations 12a on the rod 12. A helical spring 19 acts to induce tension in the cable run. Engagement of part frusto-conical faces 15 on the collets 13 with a frusto-conical face 16 on the tubular housing 11 acts to urge the collets into locking engagement with the rod 12. A restraint means (30, 40) serves to hold the rod in the extended position during connection of the device into the cable run and is released to place the device in service. The restraint means includes an axially moveable release tube 13 located for restricted axial movement on the tubular housing 11 and formed with an eccentric counter-bore 37b. A locking member 40 is formed with an eccentric boss 41 located in the eccentric counter-bore 37b and inwardly directed serrations, such that rotation of the locking member through a restricted arc brings the serrations into engagement with the serrations 12a on the rod 12 axially to lock the rod.

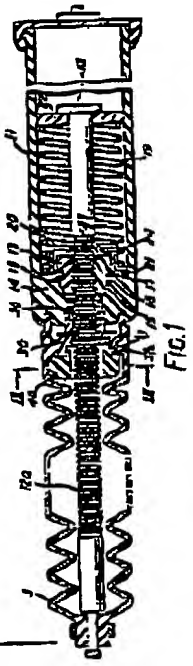

Fig.1

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Description

CONTROL CABLE ADJUSTER DEVICE.

This invention relates to control cable adjuster devices and, more particularly to devices insertable into control cable runs either at intermediate locations or adjacent terminations to provide tensioning of the cable run, such as in foot pedal operated cable controlled brake systems or clutches in automobiles.

In EP-A-0267685 there is disclosed a control cable adjuster device including a tubular housing having at one end a first anchorage connectable into a cable run and at the other end locating means for a termination member resiliently biased movably to extend co-axially of the tubular housing between a position fully retracted into, and a position fully extended from, the tubular housing, the termination member being formed on the surface thereof with circumferential serrations engageable with collet members and, on the end thereof remote from the tubular housing, a second anchorage connectable into the cable run, and restraint means provided adjacent a portion of the termination member rod external to the tubular housing moveable between an engaged position in which a portion of the restraint means is engaged with the termination member rod such that relative movement between the termination member rod and the tubular housing is restrained and a disengaged position in which the restraint means is disengaged from the termination rod.

By the present invention, the restraint means of the device includes a first member located on the tubular housing and formed with a bore co-axial with the termination member rod through which the termination member rod freely extends, and a second member located to be eccentrically rotatable in relation to the central axis of the bore of the first member, the second member having a central bore formed with an internal projection and being rotatable eccentrically between the engaged position in which the internal projection engages in the serrations on the termination member rod and the disengaged position in which the internal projection is radially spaced from the serrations.

The invention will now be described, by way of example, with reference to the accompanying, partly diagrammatic, drawings, in which:-

Figure 1 is a longitudinal sectional view of a self-adjusting cable control device in an engaged and unlocked configuration;

Figure 2 is a longitudinal sectional view of a portion of the device showing the device in a locked configuration;

Figure 3 is a longitudinal sectional view of a portion of the device showing the device in an unlocked and disengaged configuration;

Figure 4 is an end view of a release tube member;

Figure 5 is a cross section taken on the line V-V in Figure 4;

Figure 6 is the other end view of the release tube member, with a portion broken away;

Figure 7 is an end view of a locking member;

Figure 8 is a cross section taken on the line VIII-VIII in Figure 7;

Figure 9 is a cross section taken on the staggered line IX-IX in Figure 1; and

Figure 10 is a cross section taken on the staggered line X-X in Figure 2.

Referring to Figures 1 to 3, the self-adjusting cable control device is arranged to be interposed in a cable run (not shown) and comprises a connecting member in the form of a tubular housing 11 having at one end a cap 10 carrying a cable anchorage crimped in position. A termination member in the form of a rod 12 extends through an opening in the other end portion 14 of the tubular housing end 11 which opening serves to locate the termination member rod. The device is connected into a cable run with first and second anchorages (not shown in detail) on the end cap 10 and on the termination member rod 12.

Clutch means releasably connecting the tubular housing 11 and the rod 12 include collet members 13 positioned around the rod 12 within the end portion 14 of the tubular housing 11. Each collet member 13 has a first, external, part frusto-conical surface 15 at one end adapted to engage a complementary, first, internal frusto-conical surface 16 on the end portion 14. A circumferential retaining spring 17 extends circumferentially in aligned grooves 18 in each collet member 14 resiliently to urge the collet members 13 radially inwardly into contact with the termination member rod 12. A helical spring 19 interposed between a cup washer 20 seated on an abutment or shoulder 21 on the end portion 14 and a disc 22 fixed on the end of the termination member rod 12 axially inwardly of the housing 22 and to the right as seen in Figure 1. Each collet member 13 is also formed at the end thereof opposite the end having surface 15, with a second, internal, part frusto-conical surface 23, complementary to a second, external, frusto-conical surface 24 on the cup washer 20. The radially inner faces of the collet members 13 and a portion of the rod 12 are circumferentially grooved to form axially spaced, co-acting, 90° triangular profile, serrations 13a, 12a. The interengagement of the internal part frusto-conical surfaces 23 of the collet members 13 with the external frusto-conical surfaces 24 of the cup washer 20 serves to assist the collet members 13 to disengage from the serrations 12a on the radially inner faces upon relative axial movement occurring as described hereinafter.

As shown in Figures 4 to 6, an axially moveable release tube member 30 extending through the end portion 14 around the termination member rod 12 has an inner end portion 32 of cylindrical form having a co-axial bore 31 on axis L_1 and provided with an external, circumferential rib 35, the cylindrical wall being formed with slits 33 to facilitate assembly by enabling the rib 35 to be deflected inwardly to be snapped past a circumferential rib 36 on the end

portion 14 of the tubular housing to retain the tube member 30 against axially outward movement relative to the end portion whilst allowing limited axial movement.

Circumferentially spaced, axially extending, external splines 32a on the inner end portion 32 of the release tube member mate with complementary axial grooves 14a in the end portion 14 of the housing 11 to restrain relative rotation between the inner end portion 32 and the housing 11. An outer end portion 37 of the release tube member 30 has a radially outer cylindrical surface 37a co-axial with the axis L_1 of the inner end portion 32 and an eccentric bore 37b with a circumferential groove 38 on an axis L_2 offset from the axis L_1. The base of the eccentric bore is formed with a segmental recess 39 having radial end faces 39a, 39b. A face 32b on the outer end portion 37 serves to limit movement axially inward of the tubular housing.

As shown in Figures 7 and 8 a locking member 40 includes a knurled portion 43 and co-axial central bore 44 with an eccentric boss 41 having a radially outer cylindrical surface (of diameter equal to that of the eccentric bore 37b) and a circumferential rib 48 with an axis L_1, offset from the axis L_2 of the bore 44. A projection 47 is provided on the end face of the boss 42. A part cylindrical projection 45 is provided on the face of the bore 44 and is formed with an axially spaced array of circumferentially extending serrations 46 complementary to the serrations 12a on the rod 12.

The locking member 40 and the release tube member 30 are assembled together by pressing the boss 42 on the locking member 40 into the eccentric bore 37b of the release tube member 30 such that the circumferential rib 48 mates with the circumferential groove 38 and the projection 47 registers with the segmental recess 39. The inner end portion 32 of the release tube member 30 is then assembled on to the end portion 14 of the housing 11 by pressing the inner end portion 32 into the end portion 14 and the axial splines 32a in register with axial grooves 14a to urge the circumferential rib 35 on the inner end portion past the circumferential rib 36 on the end portion, the slits 33 facilitating this operation.

With the locking member 40, the release tube member 30 and the tubular housing assembled together, the locking member is rotatable through a restricted arc, which arc is determined by the projection 47 contacting the radial faces 39a, 39b of the recess 39. Since the locking member 40 rotates about the axis L_2 offset from the central axis L_1 of the tubular housing, the spacing of the cylindrical projection 45 and serrations 46 from the central axis L_1 is varied with rotation from an unlocked position out of contact with the rod 12 - which thus is free to move axially of the bore 44 - and a locked position in which the serrations 46 fully engage with the serrations 12a on the rod - thereby restraining axial movement of the rod relative to the locking member 40. Since the locking member 40 is connected through the circumferential rib 48 and groove 38 to the release tube member 30, which in turn is connected for limited axial movement to the tubular housing 11, relative axial movement between the housing and the rod 12 is restrained when the locking member 40 is rotated to the engaged position other than for a short movement permitted by the spacing of the face 32b and the circumferential rib 35 on the release tube member 30 in relation to the location of the circumferential rib 36 and end face of the end portion 14 of the tubular housing, to facilitate dis-engagement of the collet members 13 from the rod 12.

A convoluted shroud or boot S of elastic material surrounds the locking member 40 and seats in the end portion 14 of the tubular housing 11 and on the rod 13 to provide a seal against dirt, oil and other deleterious matter.

In operation, to install the device into a cable run, the locking member 40 is rotated into a position indicated in Figures 1, 3 and 9 in which the rod 12 passes freely through the bore 44. The locking member 40 and the release tube member 30 are then urged axially toward the tubular housing 11 to move the release tube 30 axially into the tubular housing, thereby moving the inner end 50 into contact with the collet members 13 and, by the inter-action of the sets of frusto-conical surfaces 23, 24, moving the collet members 13 axially and radially out of engagement with the serrations 12a on the rod 12. Tension is then applied to the rod 12 and the tubular housing 11 to withdraw the rod 12 axially from the housing to an extended position and thereby compress the helical spring 19. With the rod 12 at the extended position indicated in Figure 1, the locking member 40 is rotated to engage the serrations 46 on the portion 45 with the serrations 12a on the rod - by virtue of the eccentricity of the boss 41 - thereby preventing retraction of the rod 12 into the tubular housing 11 by the effect of the helical spring 19. The device is then connected into the slack cable run by attachments (not shown) to the tubular housing 11 and rod 12. Having effected attachment, the locking member 40 is rotated to the original position in which the rod 12 passes freely through the bore 44, whereupon the resilience of the helical spring 19 urges retraction of the rod 12 axially into the housing 11 and applies tension to the cable run. Upon the helical spring 19 reaching full extension commensurate with the tension in the cable run, at an intermediate position of retraction of the rod 12 into the tubular housing 11, the resilience of the circumferential retaining spring 17 is such as to overcome the radial component of the force across the serrations 12a, 13a and urge the collet members 13 radially inwardly to bring the serrations into engagement, thereby restraining axial movement between the tubular housing 11 and the rod 12. Movement of the collet members radially inwardly urges the release tube member 30 axially outwardly. If, during use, the tension in the cable run falls below the force exerted by the helical spring 19 to an extent that axial movement of the rod 12 relative to the tubular housing 11 brings the frusto-conical faces 23, 24 into abutment and the radial component of the force across the serrations 12a, 13a and the frusto-conical surfaces 23, 24 is sufficient to exceed the force exerted by the circumferential retaining

spring 17, the rod 12 being at an intermediate position of retraction, the collet members 13 move radially outwardly out of full engagement with the rod so that the respective serrations 12a, 13a ratchet to a new axial position to restore the balance of forces by adjusting the effective length of the cable run within the limits imposed by the length of the tubular housing 11.

Since the convoluted shroud or boot S is flexible, rotation of the locking member 40 can be effected by applying manual pressure through the convoluted shroud or boot adjacent the knurled portion 43 whilst holding the tubular housing 11, so that the convoluted shroud or boot serves at all times to limit ingress of grease or dirt or other deleterious matter into the tubular housing 11. The shroud or boot S also serves to bias the locking member 40 and the release tube member 30 away from the tubular housing 11.

It will be appreciated that the serations may be formed as a screw thread rather than axially spaced circumferential grooves.

It will also be appreciated that whilst the foregoing description envisages the device being connected into a run of core cable, preferably at one end thereof, the device is readily modified to be connected into a run of conduit of a control cable. In such an arrangement the core cable extends centrally through the device and the conduit is connected to the end of the tubular housing 11 and the rod 12, which are made hollow to accommodate the core cable. Alternatively, the conduit in the form of a tightly wound wire spiral, may be substituted for the rod provided strength considerations allows.

Claims

1. A control cable adjuster device including a tubular housing (11) having at one end a first anchorage (10) connectable into a cable run and at the other end locating means for a termination member (12) resiliently biassed to movably extend co-axially of the tubular housing (11) between a position fully retracted into, and a position fully extended from, the tubular housing, the termination member (12) being formed on the surface thereof with circumferential serrations (12a) engageable with collet means (13) and, on the end thereof remote from the tubular housing, a second anchorage connectable into the cable run and restraint means provided adjacent a portion of the termination member rod (12) external to the tubular housing (11) moveable between an engaged position in which a portion of the restraint means is engaged with the termination member rod (12) such that relative movement between the termination member rod (12) and the tubular housing (11) is restrained and a disengaged position in which the restraint means is disengaged from the termination member rod (12), characterised in that the restraint means includes a first member (30) located on the tubular housing (11) with a bore (31) co-axial with the termination member rod (12) through which the termination member rod (12) freely extends, and a second member (40) located to be eccentrically rotatable in relation to the central axis of the bore (31) of the first member (30), the second member (40) having a central bore (44) formed with an internal projection (45) and being rotatable eccentrically between the engaged position in which the internal projection (45) engages in the serrations (12a) on the termination member rod (45) and the disengaged position in which the internal projection (45) is radially spaced from the serrations (12a).

2. A control cable adjuster device as claimed in Claim 1, characterised in that the internal projection (45) has a radially inner face of part cylindrical configuration and is formed with an axially spaced array of circumferentially extending serrations (46) complementary to the serrations (12a) on the termination member rod (12).

3. A control cable adjuster device as claimed in Claim 1 or Claim 2, characterised in that the second member (40) is formed with an eccentric boss (41) having a radially outer cylindrical surface with an axis (L_1) offset from the axis (L_2) of the central bore (44) of the second member arranged to co-act with an eccentric bore (37b) formed in the first member (30).

4. A control cable adjuster device as claimed in Claim 3, characterised in that relative axial movement between the first member (30) and the second member (40) is restrained by means of a circumferential rib (48) formed on one of the members (30,40) co-acting with a circumferential groove (38) formed on the other of the members (30,40).

5. A control cable adjuster device as claimed in Claim 3, or Claim 4, characterised in that the relative movement between the first member (30) and the second member (40) is restricted by means of a projection (47) on one of the members (30, 40) co-acting with stops (39a, 39b) formed on the other of the members (30, 40).

6. A control cable adjuster device as claimed in any preceding claim, characterised in that the first member (30) is formed with a cylindrical inner end portion (32) arranged to seat in an end portion (14) of the tubular housing 11.

7. A control cable adjuster device as claimed in Claim 6, characterised in that the relative axial movement between the first member (30) and the tubular housing (11) is restricted by means of an external circumferential rib (35) formed on the inner end portion (32) of the first member (30) and spaced from a shoulder (32b) on a main portion of the first member (30) co-acting with an inwardly directed circumferential rib (36) on the end portion (14) of the tubular housing (11) spaced from an end face of the end portion (14) by a distance slightly less than the spacing between the circumferential rib (35) and the

shoulder (32b) on the first member, the inner end portion (32) of the first member being formed with axial slits (33) to facilitate deflection enabling assembly of the inner end portion (32) within the end portion (14) of the tubular housing (11).

8. A control cable adjuster device as claimed in Claim 6 or Claim 7, characterised in that the relative rotational movement between the first member (30) and the tubular housing (11) is restrained by means of axial splines (32a) formed either on the external cylindrical surface of the inner end portion (32) of the first member (30) or on the internal cylindrical surface of the end portion (14) of the tubular housing (11) co-acting with axial grooves (14a) formed respectively either on the inner cylindrical surface of the end portion (14) of the tubular housing (11) or on the external cylindrical surface of the inner end portion (32) of the first member (30).

9. A control cable adjuster device as claimed in any preceding Claim, characterised in that the first member (30) is moveable axially of the tubular housing (11) over a restricted distance to contact the collet means (13) and, upon further restricted axial movement, to urge the collet means (13) out of engagement with the serrations (12a) on the termination member rod (12).

10. A control cable adjuster device as claimed in any preceding Claim, characterised in that the second member (40) is formed with an enlarged knurled flanged portion (43).

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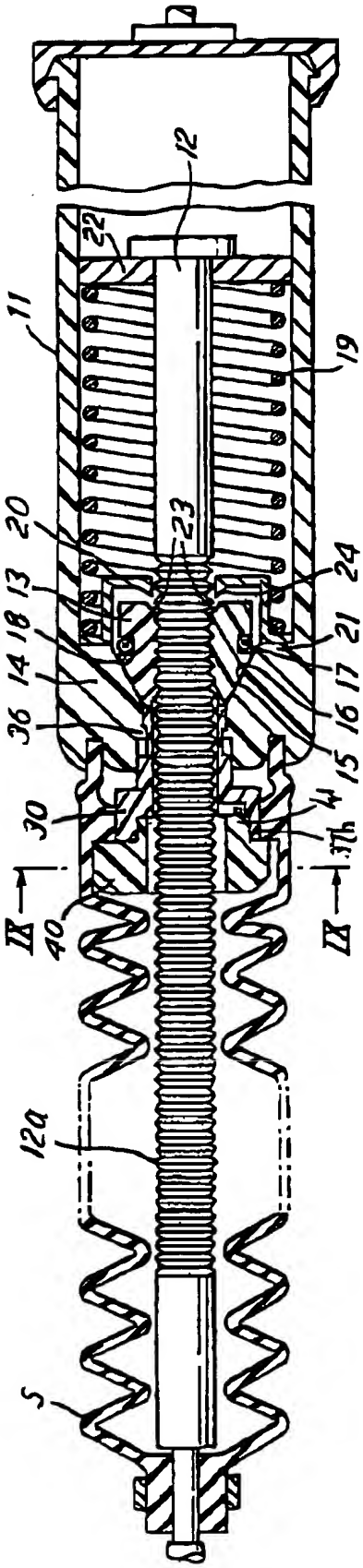

FIG.1

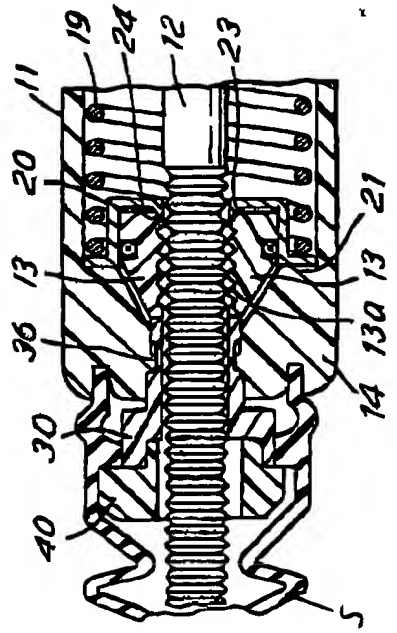

FIG.3

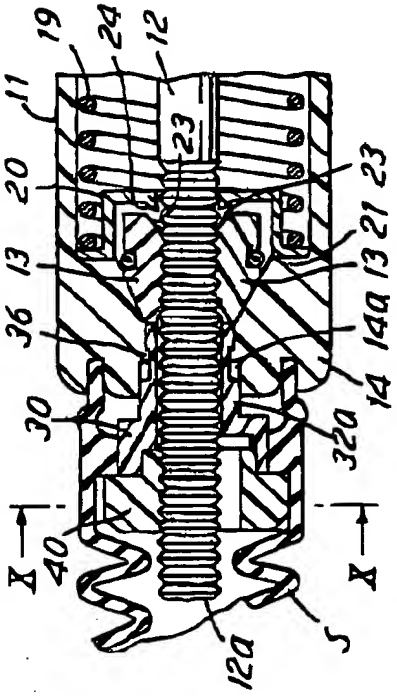

FIG.2

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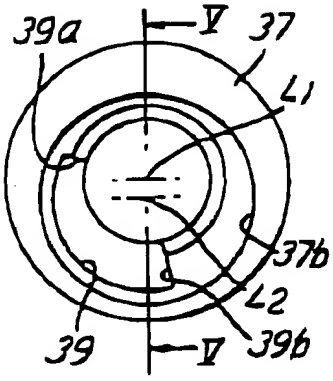

FIG.4

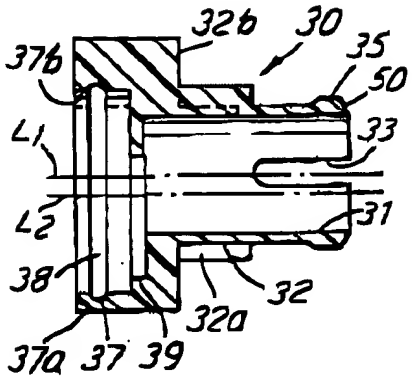

FIG.5

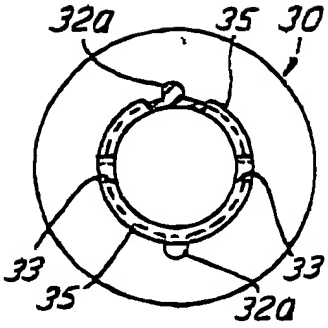

FIG.6

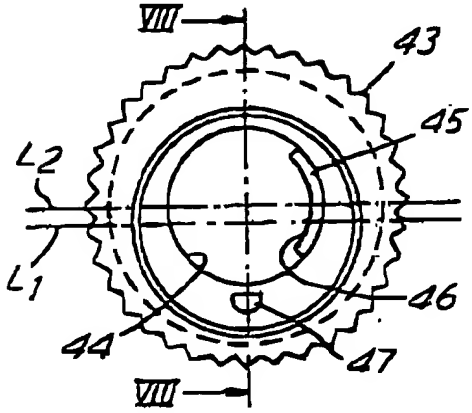

FIG.7

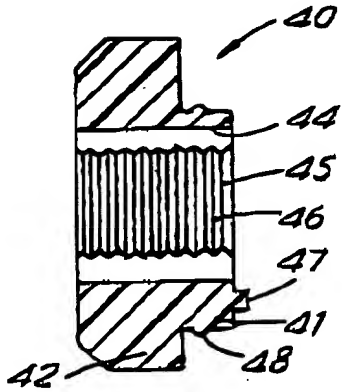

FIG.8

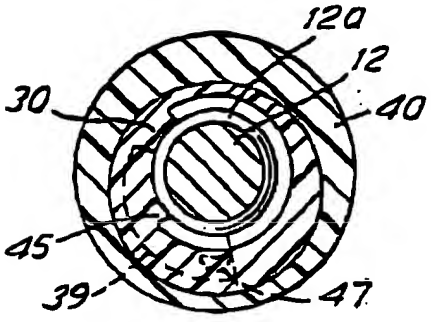

FIG.9

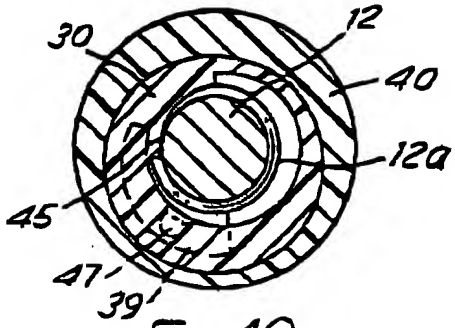

FIG.10

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Fig.1

EP 0 312 382 A3

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 88309641.4

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	EP - A2 - 0 234 864 (A.BABCOCK INC.) * Totality * --	1	F 16 C 1/22
P,D, A	EP - A2 - 0 267 685 (BABCOCK INDUSTRIES INC.) * Fig. 1, belonging text * --	1	
A	US - A - 4 543 849 (YAMAMOTO et al.) * Column 3, line 2 - column 6, line 50; fig. 3-8 * --	1	
A	US - A - 4 378 713 (HASKELL et al.) * Totality * --	1	
A	FR - A2 - 2 617 920 (ACCO SOCIETE DES CABLES DU MANS) * Fig. 1-3, belonging text * ----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4) F 16 C 1/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	28-09-1989	ROUSSARIAN

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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DIALOG(R)File 351:DERWENT WPI

009281603 **Image available**
WPI Acc No: 92-409014/199250
XRPX Acc No: N92-311949

Two-section control cable - has bushes and coupling elements which can be assembled by simple axial movement, making them suitable for automated or robot assembly

Patent Assignee: ACCO TELEDYNAMIQUE (ACCO-N); ACCO LA TELEDYNAMIQUE (ACCO-N)
Inventor: BEAUFILS D
Number of Countries: 005 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP--517583	A1	19921209	92EP-0401513	A	19920603	F16C-001/12	199250 B
FR-2677086	A1	19921204	91FR-0006667	A	19910603	F16C-001/12	199305 E

Priority Applications (No Type Date): 91FR-0006667 A 19910603
Cited Patents: DE-8910999; FR-2604225; GB-1118165; GB-1241548; GB-2162273; GB-2200706; US-4884468
Patent Details:

Patent	Kind	Lan	Pg	Filing Notes	Application	Patent
EP--517583	A1	F	13			

Designated States (Regional): DE ES FR GB IT

Abstract (Basic): EP 517583 A

The two-section control cable, e.g. for a motor vehicle accelerator, consists of a first section (1) with a housing (3) in which the cable end (4) can slide, and an end bush (5). The cable end is equipped with a coupling element (6).

The second section comprises a cable end (9) inside a sleeve (8) and a bush (10) with a seat for a projecting tip (11), shaped to fit inside the first section's coupling element (6) when the two are pushed together. The two bushes (5, 10) also have complimentary shapes so that they join by pushing together, and the housing (1) also contains a compensating spring (12).

ADVANTAGE - Suitable for automated or robot assembly, being rigidly joined together by simple axial movement.

ec

Dwg.1/12

Title Terms: TWO; SECTION; CONTROL; CABLE; BUSH; COUPLE; ELEMENT; CAN; ASSEMBLE; SIMPLE; AXIS; MOVEMENT; SUIT; AUTOMATIC; ROBOT; ASSEMBLE
Derwent Class: Q13; Q62; Q64
International Patent Class (Main): F16C-001/12
International Patent Class (Additional): B60K-026/00; F16G-011/02
File Segment: EngPI
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